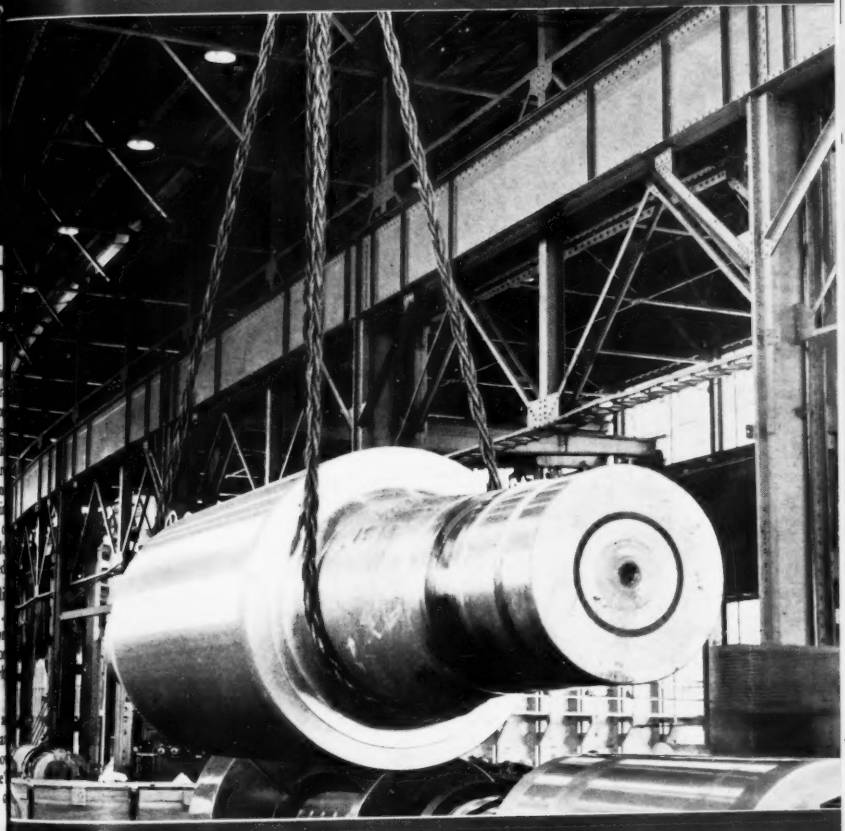
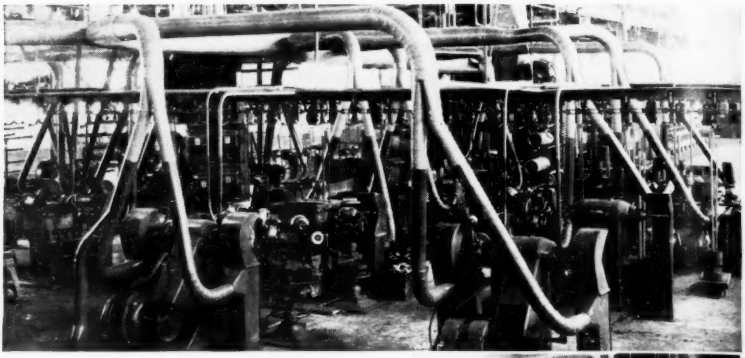
Occupational HAZARDS & SAFETY



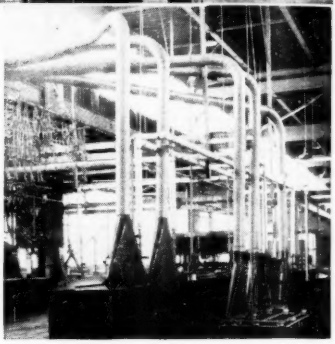
AUGUST, 1939

There's Profit in Prevention



KIRK & BLUM SYSTEMS

"Clear the Air" at Canadian Motor Lamp Company . . . . . .



The Kirk & Blum Dust Control System shown above serves the polishing and buffing departments at the Canadian Motor Lamp Company's Windsor plant. Two fans discharge the air into a centrifugal-type collector for removal of heavier dust, lint and tripoli, then through a cloth screen dust arrester for removal of remaining light dust. Acid fumes and vapors are removed from the plating department by the K & B System illustrated at the right.

Thus—here, as in plants of many industrial leaders throughout the nation, Kirk & Blum Systems help to protect men and machines, improve working conditions and morale, increase production, insure a better product, cut maintenance costs, save on insurance rates.

The services of Kirk & Blum Engineers are available to solve your dust control and fume removal problems. Write for details and books of interesting, valuable information.

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Louisville: Liberty Eng. & Mfg. Co., Inc., 1450 S. 15th St.

KIRK & BLUM

DUST AND FUME CONTROL

ENGINEERS AND CONTRACTORS

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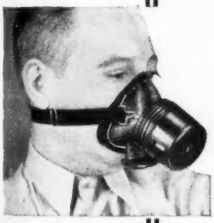
The WILLSON Industrial Hygiene Laboratories continue to work hand in hand with industry in the development of safe and efficient respiratory protective devices. Our latest laboratory developments include two styles approved for Type A Dusts and now approved for LEAD Dusts.

Nos. 200 and 750 approved for Type A Dusts

2 Styles
NOW APPROVED FOR LEAD AND TYPE "A" DUSTS

Nos. 200L and 750L approved for Lead Dusts



No. 200 for Type A Dusts
No. 200L for Lead Dusts

Employs a felt filter which is easily cleaned by introducing a jet of compressed air into the core. Bears U. S. Bureau of Mines Approvals Nos. 2118 and 2123.

TYPE A DUSTS are defined as "pneumoconiosis-producing or nuisance dusts, as quartz, asbestos, iron ores, cement, limestone, gypsum, coal, coke, charcoal, wood, cellulose, flour and aluminum."

LEAD DUSTS are defined as "mechanically generated dusts whose main harmful constituent is lead" as encountered in manufacturing batteries; enameling; pottery making; rubber compounding; sandpapering and chipping painted surfaces; mining, milling and processing lead ores.

For *assured protection*, consult your nearest WILLSON Distributor. You'll find him safety minded, thoroughly qualified, and ready and willing to help and serve you.

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No. 750L for Lead Dusts

This is the only respirator requiring but one inexpensive throw-away filter on each side. Bears U. S. Bureau of Mines Approvals Nos. 2119 and 2125.

DOUBLE **WILLSON**
PRODUCTS INCORPORATED
READING, PA., U.S.A. *Established 1870*

INDUSTRIAL SAFETY EQUIPMENT ASSOCIATION

GOGGLES
RESPIRATORS
HELMETS

Useful Free Literature

The publications briefly described in this service department are prepared by manufacturers' technical experts. The data they contain on equipment supplies and prevention methods applies to varied phases of occupational hazard problems.

163—SIGNS

An illustrated bulletin by Stonehouse Signs, Inc. describing a variety of enameled steel signs for plant safety work. Includes prices.

164—CLEANING TABLES

A 16 page illustrated bulletin describing mechanical operation of airless blast cleaning of metal parts; ventilating and motor requirements. Specifications and floor plans are included in this dust control discussion by Pangborn Corporation.

165—LAMP LOWER HANGERS

An illustrated presentation by The Thompson Electric Co. which describes equipment recommended for safe use of high-position lighting.

166—WASHING METAL PARTS

The application of custom built equipment in washing, rinsing, drying, and burnishing metal parts in automotive, electrical, radio and other metal working industries. A fully illustrated presentation by N. Ransohoff, Inc.

167—WIRE ROPE SERVICE

A series by MacWhyte Co. describing the care and use of wire rope, and methods of eliminating excessive wear.

168—TRUE OR FALSE

An International Shoe Company folder, suitable for distribution to employees, showing the logic of wearing safety shoes.

169—GROUP WASHING

Developments in the group washing field, showing redesigned showers and fixtures and other improvements. A Bradley Washfountain Co. bulletin.

170—DUST DETERMINATION

Description of Mine Safety Appliance Co. new equipment for the magnification of

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particles in a microscope field, to facilitate particle size determination. Description of equipment and its application and prices are included.

171—ACID PROOF FANS

A description of The Autovent Fan & Blower Company line of specially coated propeller fans for use where highly concentrated acid or fume conditions are to be met.

172—SAFETY TOOLS

Descriptions of a group of cutting pliers, wrenches, drivers, saws, and other small tools which have completely insulated grips. A release by The Connecticut Hard Rubber Co.

Note on Management Reasons for Installing Dust Control

WHY did you install Dust Collectors?" was one of the questions asked by Sales Manager Fred A. Ebeling of the W. W. Sly Mfg. Co. of Cleveland, Ohio, in a recent letter written to some prominent and nationally known firms in various industries.

While many good reasons were given, it is noteworthy that back of all of them in general was the desire of the management to provide healthful working conditions as expressed in the following excerpts from typical replies.

". . . our installations have been made from the standpoint of improving safety and health conditions in our plants, and any information which I may give you will be more or less general, therefore without much data on the economic angle."

". . . dust nuisance was the first consideration in making these installations and we are very well satisfied with the result."

"We might say that it would be very difficult to estimate the economic returns of our dust collecting installations. These returns are intangible, although we do feel that they are there."

Our decision to install collectors at our various plants was brought about more by the desire to clean up the plants and improve conditions in general, and I might say that wherever we have made installations we have accomplished all that we set out to do. All our plant superintendents are very well satisfied with the installations and, as you know, we are again installing a number of collectors this winter which should be pretty good evidence that we thoroughly believe in them. General cleanliness around the plant and good will from the employees is, of course, an economic advantage, but it is hard to measure in dollars and cents. Only in one case were we requested by the authorities to install a collector—all the other installations are being made on our own initiative."

"We have recognized the value of dust control from the standpoint of housekeeping and better relations with the workers employed in these departments. We have found that, when the workers recognize the desire of the management to provide them with clean, healthful working areas, they immediately show a greater interest in their work, and in maintaining the premises clean and the equipment in working order."

Prominent among industries using dust control, Mr. Ebeling lists those producing asbestos, baking powder, buttons, carbon, castings, cement, clay, coal, cork, fertilizer, gypsum, lampblack, mica, ore, oxides, paint, snuff, soap powder, talcum powder, tobacco. There is a constantly growing interest in this important subject of lifting dust out of industry.

Type B

PATENTED

When desired with fireproof cap, as shown, add 35 cents to quoted price.

JACKSON Eyeshields

Ideal for blow torch work, gas cutting and welding, this wide visioned, non-fogging shield takes standard 2 x 4¼" lenses. Lens frame is of non-inflammable Bakelite—side protectors of opaque fiber. Three-way adjustment provides a snug and comfortable fit to any head. Lens can be set at any angle.

Price complete with lens (shades 3 to 6), **$3.75.** If your dealer can't supply you, order from this advertisement.

Write for Eyeshield folder that describes this and thirteen other types.

JACKSON ELECTRODE HOLDER CO.
Dept. O-1
15122 Mack Avenue Detroit, Michigan

Protectors In Standard Safety Code

This is the fourth in the series of recommended protectors as set forth in the revised copy of "The American Standard Code for the Protection of Head, Eyes and Respiratory Organs."

Group H

PROTECTORS for Electric Arc Welding and Cutting—The helmet and shield are the only permissible styles. The operator may need a respirator in addition to helmet or shield, or an air-supplied shield, if fumes and gases are produced in confined spaces.

Protectors

Helmets—Helmets shall be made of a material which is an insulator for heat and electricity, is not readily flammable, and is capable of withstanding sterilization. They shall be arranged to protect the face and ears from direct radiant energy from the arc. Helmets shall be provided with one or two windows arranged to accommodate and hold securely window glasses of the dimensions specified below, single or multiple, with cover glass, and designed to permit renewal of the glasses. Absorptive glasses shall be so mounted as to be not less than 2 in. (5.1 cm) from the eyes. If supported by a headgear, the weight of the helmet, complete, shall not exceed 24 oz.

Shields—The shield shall consist of opaque material which is an insulator of heat and electricity. It shall be of such size and so shaped that it will protect the face from all direct radiant energy and shall be provided with a single window of the dimensions specified below, fitted to carry single glasses or multiple.

Specifications for Windows—Optical: shall meet tests for the transmission of radiant energy. Dimensions: Windows for both helmets and shields shall have height not less than 1.75 inches and width not less than 3.75 inches where one window is provided, or 1.75 inches where two windows are provided. These dimensions apply to the opening unobstructed by any opaque substance.

Cover Glass—A cover glass shall be provided to protect the window. It shall be substantially free from striae, air bubbles and other flaws, and shall have substantially parallel surfaces.

Protection for other workers—A guard or shield shall be provided where necessary to protect other workers from exposure to the radiation from the electric arc, and no employee shall be required to work in such position that his face is exposed to such radiation from any neighboring source. It is recommended that permanent enclosures be provided, where practical, for arc welding and cutting.

Beer Drinkers Saga

THE story of the origin of the first intimation that salt eliminates heat-fag is a rather interesting one. It seems that there was a certain group of workers in the hot rolling mill of one large steel producer who, unlike their fellow workers, did not seem to be affected particularly by heat. There was no particular difference as far as the investigators could find in the physical makeup of these men, so the investigation was carried to those men's personal habits. Among the interesting things they discovered was that this group was in the habit of sojourning to the corner saloon for beer after hours. An investigation of the quality and effect of the beer led to an impasse. Upon further investigation it was noted that all of those men were in the habit of eating tremendous amounts of pretzels and salted peanuts during this time of conviviality. This was the clue and following it up led to one of the simplest, but most striking, examples of a cure for an undesirable condition. It led to the development of salt tablets which are now almost universally used to eliminate heat-fag among workers in industry.

Ohio Has Blanket Provision

Effective May 26, 1939, Ohio joined those states which have made blanket provision for all occupational diseases. This is an important step in the trend toward development of the specific legislative action to define and qualify occupational diseases and hazard responsibility.

"Ink-Poisoning"

Plate printers and other people working with printing presses are sometimes known to have what is known as "ink-poison." In a recent test among such employees it was found that 12% of the test group gave positive reactions to ordinary ink used. It has been recommended that the control of dermatitis in this occupation include the exclusion of persons with a history of allergic disorders; periodical medical examinations and the provision of sanitary measures so that sanitary washing conditions are definitely available for workers.

Puerto Rico Gets Law

Puerto Rico recently passed a new compensation employment plan—Law 112, "to create a Board of Industrial Safety for the purpose of preventing labor accidents in industry." Among the provisions is the necessity for a "safe place of employment" —the burden of proof for the safety of the location being placed upon the employer. A Board has been annexed to the Department of Labor, according to German P. Náter, Director of the Division of Economic Social Research.

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SAFELY and EASILY
Fewer fumes • Full, steady flow • No lifting of carboy • Tubes for various acids • No acid remains in tube • Safe pressure • Empties carboys, barrels and drums.

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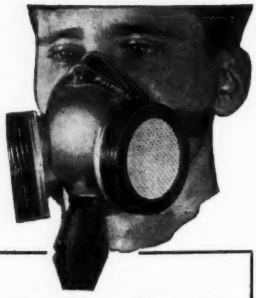

A Type for Every Hazard!

PULMOSAN RESPIRATORS

More than 40 types for dusts, fumes, gases, smoke and sprays. Every model provides utmost safety, comfort and low cost protection for its hazard. All models feature aluminum body and patented rubber face cushion. Tell us your conditions for proper recommendation. Write for complete Safety Catalog, showing entire line.

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Dept. OH, 176 Johnson St., Brooklyn, N.Y.

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GAUZTEX
THE SELF ADHERING GAUZE
MEDICATED WITH MERCURIC CHLORIDE ANTISEPTIC

Petroleum Industry

A 6 page presentation of safety hints concerning the petroleum industry consists of recommendations which the oil and gas inspectors of the Bureau of Labor Statistics of the State of Texas found occasion to make from time to time. Such points as personal equipment, fire hazards, hand tools, machinery, passage ways, electrical appliances, are covered with specific recommendations made. It is all a part of a larger program to reduce lost time among employees in the State.

Grinding Wheel Fatality

California reports its first fatality in over a year from an exploding grinding wheel. There was no hood on the wheel at the time of the accident, but the general safety orders of the State's Industrial Accident Commission require that hood guards be attached wherever it is practical.

Where hoods are not possible, protective flanges are indicated. Specifications for such flanges are given in the Safety Code for the Use, Care and Protection of Abrasive Wheels, published by the American Standards Association.

Figures of Interest

An interesting development in a recent discussion by S. C. Hickok of the Printing Works Division of Pacific Mills in Lawrence, Mass. was that when that company first started the use of safety promotion in 1935 there was a lost time accident frequency index of 4.25. Figures speak eloquently—by 1936 the figure was 3.2; the 1937 figure, .49; and 1938 figure, .38. This record was due to a couple of circumstances—1st, the management became safety-conscious in the matter of both equipment and supervision and, 2nd, employees were taught to become safety conscious. Certainly, such figures are worth the small amount of trouble involved in creating such a program.

OCCUPATIONAL Hazards AND Safety

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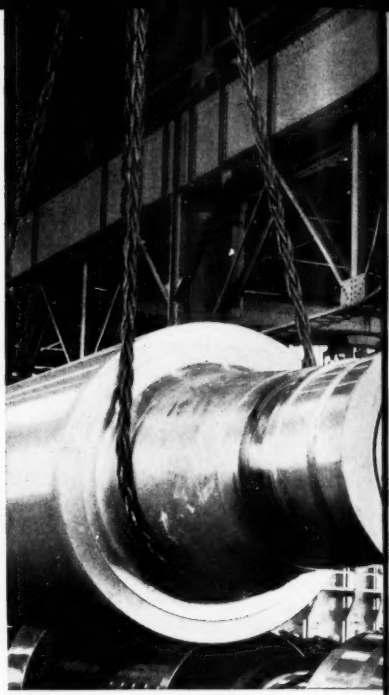
Reducing Costs and Hazards with WIRE ROPE

C. D. MEALS, *Chief Engineer*
Williamsport Division
Bethlehem Steel Co.

THE first wire rope was made in 1834, and wire rope has been in wide use for fifty years. Yet it has only been within the past twenty-five years or so that it has been extensively employed in miscellaneous kinds of lifting jobs in shops or in construction work.

Breakage of wire rope in these services can come from two main causes, either improper use of the rope or using it beyond the period of its safe service life. Fortunately in most services the condition of a rope can be determined within safe operating limits by its appearance, and it is only necessary to observe a few easily understood safe operating practices to prevent breakage that may be caused by using rope improperly.

One of the more common applications of wire rope in this class of service is in slings. The factor of safety on a new wire rope sling is dependent, to an extent, on the service and safety requirements of the



Because of the heavy loads involved where wire rope is used constant supervision to eliminate hazards of any wear is necessary. *Photo, courtesy Broderick and Bascom Rope Co.*

sling; preferably it should be 6½ as a minimum and slings should be discarded before the safety factor has been reduced to 4½.

Broken wires are the primary cause for the discarding of wire rope slings, as usually the outer wires are not subjected to much wear but frequently such wires will be distorted and crushed out of shape and the distribution of the broken outer wires will affect the remaining or reserve strength of the rope; consequently, for a sling having an initial factor of safety of 6½, it is suggested that

the sling shall be discarded when the following number of broken wires are exceeded within the length of one rope lay:

6 x 19 rope—24 broken outer wires
6 x 37 rope—40 broken outer wires

These values may seem excessive to some sling users, but used slings tested, having many more broken wires than noted above, have given surprisingly high breaking strengths.

The safe load capacities of wire rope slings should be based upon the tabular breaking strengths of ropes as given in the catalogs. It is a fact that a thimble or loop spliced in the end of the sling or a clipped connection will not develop the catalog strength of the rope and the efficiency of such attachments may vary from 75% to 95%; however, the attachments are not subject to deterioration in service and will therefore be as safe as the rope when the sling is ready to be discarded.

The fittings used in connection with wire rope slings are frequently undersize; for example, a 1″ bridle sling will be ordered with a ring at the top of 1¼″ diameter stock and inside opening of 9″; this is considerably undersize, as this ring should be of not less than 2¼″ diameter stock. Hooks too are frequently undersize as are links, eye-bolts and shackles.

Formulae for the design of such fittings are as given on plates 106, 107, 108 and 109; these are all based on formulae derived from the theory of stresses in curved beams, simplified for practical application.

The number of clips required for a thimble or loop fastening in the end of a sling, for the different diameters of ropes, are as follows:

Diam. rope—	⅜″	½″	⅝″	¾″	⅞″	1″	1⅛″	1¼″
No. clips—	2	3	3	4	4	4	4	5

All clips should be attached by placing the base or body of the clip on the pulling rope and the "U"-bolts over the short or dead end of the rope. This method will develop the maximum efficiency of the rope. All nuts on clips should be tightened up after a few loads are lifted with the sling, to take up the "set" of a new rope.

The method of attaching the sling to the load and to the crane hook is of prime importance and should be entrusted only to experienced and responsible workmen. Wire rope slings, due to their flexibility, are often bent over sharp corners of castings, etc.; this should be avoided, as it will not only set a kink in the rope but will also cut the wires of the rope; if such hitches must be made, wood padding should be used at the corners to ease the abuse on the rope.

A wire rope sling should never be used singly for lifting a heavy load, as the rope will rotate or untwist when so used and there will be a tendency for the tucks of the splice to open up or slip, which, from a safety consideration, is undesirable.

Care should also be exercised in hitching a sling to the load, so that all parts of same are equally stressed; sudden stoppages of the load should be avoided as more than one serious accident has resulted from such practice.

When materials are being hoisted by bridle slings, due consideration must be given to the angle of inclina-

tion of the parts of the rope with the horizontal, as the stresses in the sling parts will increase quite appreciably as the angle between the sling and the load is decreased; or conversely, the load capacity of the sling will be decreased; this fact will be noted in the table of safe load capacities of slings given below.

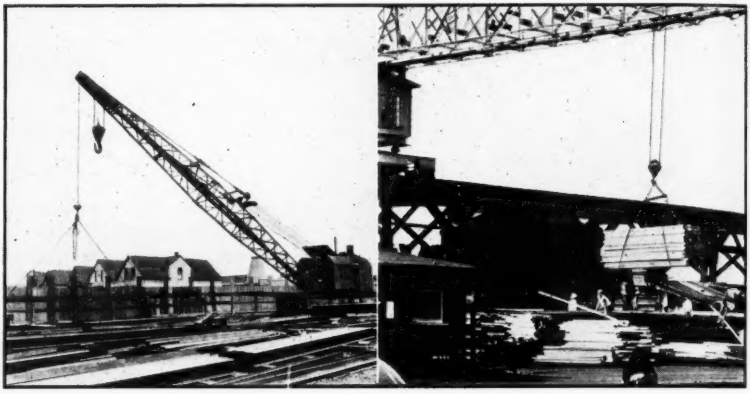
The safe load capacities of 6 x 19 and 6 x 37 Plow Steel wire rope slings are as follows; based upon a factor of safety of 6½:

For Improved Plow Steel Rope Slings, the safe loads [see bottom of page] may be increased 15″.

Another important consideration in the handling of loads will be noted and that is the compression exerted on the material being handled with the legs of the sling at an angle of inclination and these values are as shown on page 31.

These values show the importance of protecting both the sling and the

[*Continued on page 31*]



Safe Load Capacities of Wire Rope Bridle Slings—Plow Steel

Inclination of Legs of Slings with Horizontal

diam. rope	Vertical	60°	45°	30°
⅜″	3400	2900	2400	1700
½″	6000	5200	4200	3000
⅝″	9000	7800	6400	4500
¾″	13000	9200	10000	6500
⅞″	17000	14500	12000	8500
1″	21000	18000	15000	10500
1⅛″	27000	23000	19000	13500
1¼″	33000	28500	23000	16500
1⅜″	39000	34000	27500	19500
1½″	47000	41000	33000	23500

Industrial DUST CONTROL

By Roy P. Warren, Research Engineer
Buffalo Forge Co.
Buffalo, N.Y.

Part II—Types of Problems Encountered

There are probably six types of problems involved, the first two of which come under mandatory control. They relate to:

Health

Any process of industry in which the workmen or surrounding persons are subjected to injurious effects from the dusts created in a said process constitute this group. In Part IV of this paper a typical example will be discussed. Special emphasis has been placed on industrial activity in foundries, welding, those in which lead or other harmful fumes are liberated, and many others. In the past, regulatory activity has been preceded by many court actions, but it is becoming more evident each day that both authorities and industries are trying to protect the health of the workmen by anticipating all effects from exposure to dust and by installing systems of control which have proven satisfactory and which will, it is hoped, eliminate the losses which follow litigation.

Hazard

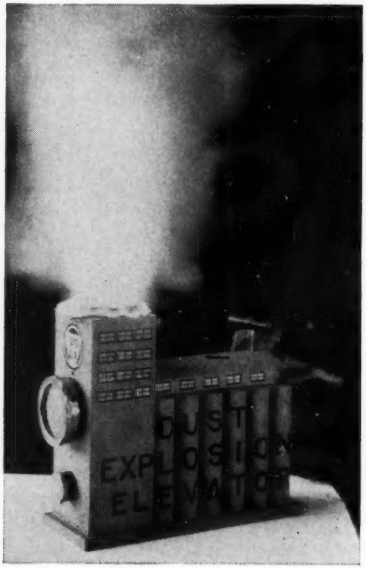
Any process of industry in which the workmen or surrounding persons are subjected to the possibility of bodily harm thru fires, explosions or the like by virtue of the creation of dusts, constitute this group. Of the major groups playing an important part in this picture are the Underwriters' groups representing the insurance angle, American Standards Association, Governmental bodies, Fire Protective Associations, all of which have joined in a concerted effort to place proper operating standards in front of and at the disposal of Industrial Management.

That such a move on the part of industry is a wise one is a foregone conclusion. Of late, much emphasis has been placed on the sound economics of such action due to decreased fixed charges, such as insurance and on the reclamation value of materials salvaged.

A typical problem of this type will be discussed later in this paper.

Recovery of Materials

This type of problem seldom exists without begin related to the two preceding types or to the two which will follow; however, there are some cases such as discussed in Part IV which do exist purely on their merits as an economical process. The value of reclaimed materials will often pay for a dust control installation in less than a year. It should be borne in mind that, to have an added sales attraction to an industrial buyer, a dust control system must be able to pay for itself in four years or less. In other words, when this condition exists it is possible to propose the system as a proper process or change in process of manufacture. Industries having to do with the handling of precious metals, glazing and the like, are quite liable to offer opportunity for direct savings in operations.



Miniature elevators are used by the Chemical Engineering Research Division in the U. S. Dept. of Agriculture to simulate explosions.

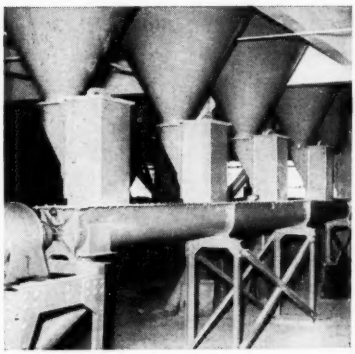
Process Control

An alert industrial management is ever watchful for an opportunity of improving quality on one hand and decreasing the number of rejected articles on the other hand. The benefits of this attitude not only reflect in the effect on the article directly affected, but may also reflect benefits in larger pieces of equipment of which the smaller unit is an integral part.

Such items as may be encountered in the manufacture of optical parts, sound units, films, film coating emulsions, lenses, precise measuring equipment and the like, all offer an excellent field for this kind of effort.

Economic Operation of Equipment

It has been demonstrated that proper dust control will in some instances permit the operation of mech-



Enclosed screw conveyor to bin in glass manufacturing plant dust collector. Heavy concentration of silica, sand, and clay are under control. *Photo courtesy U. S. Dept. of Labor*

anized equipment at a much lower cost than without such control. It may truthfully be said that in at least one instance it was demonstrated that a process of manufacture was intolerably delayed and the cost raised beyond all reasonable proportions because the equipment incidental to that process failed due to dust conditions.

Thus, sometimes the value of dust control must be computed in terms of final costs and not unit costs.

General Note

These brief descriptions of the major grouping of problems in dust control work may well serve as a background upon which we can now build our specific cases. A complete treatise on the entire subject will, if written, probably be incomplete before the readers are thoroughly familiar with the contents because process development departments of industry are constantly adding to the possibilities of applied industrial control of dust, research departments are likewise finding out how desired results may be obtained and alert managers and salesmen are co-operating in a patient search for practical means of applying the findings as they are released.

Industry might be classed in two groups, those to whom the search for dust control is retroactive, or in plainer terms, those who have suffered losses financial or otherwise due to litigation, fires, explosions, etc. These in general will consist of those industries in the health hazard and otherwise hazardous occupations—cereal mills, elevators, starch factories, industries dealing directly or indirectly with the manufacture or use of chemicals, paints, films; foundries, welders, and those working with metals, woods; and of course, certain types of mines, coal handlers and others.

Then, the second group would comprise those desiring only increased quality, reduction of losses, or gain in operating facilities, probably better described as those representing an interest solely for economic benefits.

Prominent manufacturers of dust control equipment list industrial users in about 50 of the major industries. These types broken down into potential sales represent literally thousands of prospective customers for dust control systems.

Completely enclosed exhaust belt conveyor capable of carrying more than 2500 ton of silica per day. *Photo courtesy U. S. Dept. of Labor*

Solutions to SAFETY PROGRAMS in Widespread Industrial Operations

C. E. RALSTON, Safety Director
Pittsburgh Plate Glass Co.

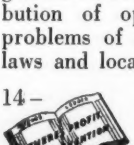
THE extensive operations of the Pittsburgh Plate Glass Company have presented safety problems found in practically all the industries. The manufacturing plants are located in fourteen states and, of course, have geographical differences in employee's problems, as well as product. There are four large factories in the Plate Glass Division complete with machine shop and one foundry. The Plate Glass Factory in Missouri has a very extensive silica sand mine as one of its operations. Grinding sand for the Pennsylvania factories is dredged from the Allegheny River and transported in company owned and operated equipment. The Window Glass Division consists of three large factories. The Paint Division has seven factories, while the Brush Division has two. The Chemical Division also has two plants,—one of which is a cement plant with a large quarry. The Clay Products Plant produces clay forms for the glass industry. Two coal mines are owned but not operated at present.

The above plants are located in Pennsylvania, New Hampshire, New Jersey, Maryland, West Virginia, Ohio, Oklahoma, Michigan, Indiana, Wisconsin, Minnesota, Missouri, Oregon and California. This wide distribution of operations presents the problems of as many compensation laws and local state requirements.

Selling the Idea

When the present Safety Program was inaugurated we had a slightly different situation than found in most companies. The higher executives were interested and convinced of the need of such activities. This meant that our efforts were concentrated on the employees of each unit with their local supervisors. Selling the idea to the rank and file was much easier than otherwise would have been the case.

The plant safety Engineers and inspectors were very carefully selected in order to secure men who were conversant with the operations as well as those who had personality and ability to handle men. These men report directly to the Plant Manager, as well as the Safety Director, and this arrangement has worked out in a very satisfactory manner. They were placed in charge, not only of the local Safety work, but also the Plant Hospitals—Physical Examination—Compensation—Health and Accident—Group Life Insurance and other related activities. In the smaller plants, these men are in complete charge of employment. Teaching safety in all schools adjacent to our operations has been encouraged and supported, and available suitable material is furnished through the Plant Safety Supervisor. Many of the scholars in



these schools are from the homes of our employees and will become employees themselves. Some of our plants have three generations in service.

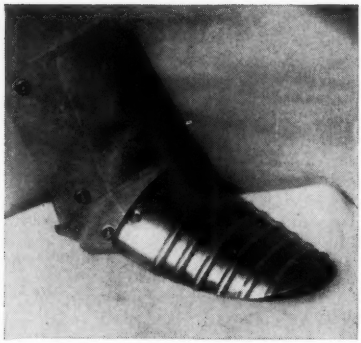
The delivery of glass is not necessarily hazardous for employees. Here we see common sense equipment available to them.

The present Safety Program was inaugurated February 1st, 1923 and had as a challenge the bad record of the year 1922 when 1366 Lost Time cases had been reported. With the organization of Safety Committees among the employees, a start was also made in the development of personal protective equipment, and through the Engineering Department, steps taken to make advisable changes in operating equipment. Wherever indicated, by past experience, suitable protective equipment of a good quality of chrome leather was developed to protect the arms, bodies, legs or feet of those exposed to injuries to these members.

In purchasing Safety Equipment we have always considered quality and service first. Cheap equipment, or materials, are a poor investment and quite readily raise the question of sincerity on the part of the management, in the minds of the employees. Injuries received through the failure of Safety Equipment, purchased to protect, would soon wreck any Safety Program.

Employee Cooperation

The employees, through their committees, entered heartily in this work, with the understanding that when each piece of equipment had been finally approved, it must be worn, or no work. Goggles were supplied wherever there was an eye hazard and the best available respirators were procured for use in atmospheres contaminated with dust or other injurious substances. The need for each piece of protective equipment was carefully explained to the employees concerned and soon their co-operation was very marked. The Engineering Department co-operated 100% and soon changes were made in manufacturing equipment as well as methods. Careful consideration was given to conditions which might cause injuries, as the need for the prevention of injuries before they occurred was urged on all concerned. One of the outstanding changes made and probably the most important was the development of suction frames for the handling of glass in place of the straps and clamps formerly used. This eliminated much of the handling of glass by hand and enables the men to work in safety. No injuries have been



recorded as chargeable to the failure of the suction frames which is proof of their value from this angle. So many changes have been made in the last fifteen years that glass manufacturing has been made one of the safest of all industries.

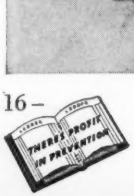
In addition to the educational work carried on within the plants, the community work was also developed. Meetings of an educational nature were held for the benefit of the families of employees. Much good resulted from these meetings and a better understanding of the entire Safety Movement was soon apparent.

One very important part of our program is our Plant Safety Contest. This was started in 1924 after we had had an opportunity to get our work well started. The Contest was placed on an annual basis as Safety is an operating problem for every day in the year and should not be stressed for a given period only. Suitable trophies are used and at the end of each quarter the trophy goes to the plant having made the greatest per-

centage of reduction over the same quarter of the previous year. At the end of the year the Plant having the greatest percentage of reduction over the previous year becomes the perma-

[*Continued on page 28*]

On the left a foot protector for girls in the optical glass department. Upper left—Foot protection for men used in both plate and window glass departments. Above—Hand and forearm protection for all employees handling glass. Sane measures of safe handling, properly merchandised to employees, are available to reduce industrial hazards in glass manufacturing.



This month in *Washington*

By W. T. Cameron
Chief Safety Adviser, Division of Labor Standards,
U. S. Department of Labor

Controlling Atmospheric Contamination

THERE are two recognized regulatory approaches to the prevention of occupational injuries and diseases resulting from exposure to poisonous or deleterious materials, dusts, vapors, fumes or gases. The first and older method is by Exhaust Codes which outline in detail hood shapes, pipe sizes, gauge of metal, air flow, angle of bends, etc., step by step, to the ultimate disposal of the harmful substance.

The second method is by Codes of Permissible Limits of Concentration of Harmful Substances. Several State regulatory bodies are experimenting with this approach and have issued permissible limits codes for some of the more common atmospheric contaminants. This method says in effect, "The air in your workroom, Mr. Employer, cannot be contaminated beyond these established safe limits; the State doesn't care how you accomplish the prescribed degree of air purity, or how much better a job you do, but these are the limits beyond which you must not go."

The proponents of the "shape-of-hood-pipe-size-air-flow" code says that industry needs a blueprint, that once a suitable design is developed for a machine or process that has proved effective, the details should be passed along to all industry operating similar machines and concerned with correcting similar conditions. "By specifying the control devices," they argue, "industry is saved the cost of experimentation and, most important, the very existence of the device built in accordance with the rules, operating with the prescribed amount of airflow, is prima facie evidence of compliance. Nothing intangible, no hocus-pocus, no mysterious air sampling gadgets—it either is, or is not, acceptable."

Opposed to this theory, the pro-

ponents of the permissible limits code ask, "When did the States get a corner on the engineering brains of the country?" Your detailed methods retard progress, stifle ingenuity and curtail inventiveness! Every time industry develops a new process or a new way of running an old one, they have to go through a lot of red tape satisfying the regulatory agency that the control measures installed accomplish the same results as the specified method. And further, telling the worker he's safe because there is installed on his machine the State prescribed device is like telling a pedestrian that if he is hit by a car while standing in a safety zone, it just doesn't count.

"But," say the ventilation code enthusiasts, "every permissible limit depends upon first knowing the threshold limit of toxicity—the point where men begin to get sick, or where the intake of the poison is faster than the elimination—and second, adding to that a 'factor of safety.' You depend on medical studies in the establishment of your limits, while we depend on engineering which is by far a more exact science. How can you prove you are not placing an undue hardship on industry—prove you are now setting limits all out of reason to the hazard? Your method depends on elaborate methods of collecting samples over long periods of time, in different parts of the workroom, and under a variety of conditions of weather, temperature and humidity. The analysis of those samples involves a lot of hieroglyphics that are incomprehensible to the average employer, while any good mechanic or corner tinsmith can understand our blueprints."

And so it goes. I wonder if the answer does not lie in a combination of both approaches; first, the establishment of a limit of atmospheric pollution which is known to be safe, and second, suggestions to industry as to how the permissible limits may be reached. Include the plans and blueprints as guides, not acceptable as evidence of compliance however, until it is known that the degree of purity established by the permissible limit has been reached.

Forty-Eight Ways Around Robin Hood's Barn

NOT long ago a prominent safety speaker said, "In this speeding century, safety administration must keep pace with the industry it is designed to fit, and safety legislation must continuously reorient itself to the new and ever-changing industrial environment in which it is meant to operate. The law must be such that it will not hinder industrial progress; the progress must be such that it will not jeopardize life." The adoption and enforcement of governmental safety and health regulations flow from the exercise of the police power which is an inherent right of the State in prescribing rules for the welfare of its citizens and in regulating the use of private property so as to best promote the health, safety and general welfare of the working segment of the public.

It is my fundamental belief that every worker should, by law, be *equally* well protected from accident and health hazards whether he works in Maine or Mississippi, New York or New Mexico. I feel that *by law* he should be supplied with a safe and sound ladder, protection for his eyes, a guarded machine, whether he works in an industrial plant employing 10,000 men, or 10 men. But one of

our greatest difficulties today is the total lack of safety legislation in some of our States and a great confusion due to lack of uniformity between those States which *have* made some effort to put safety laws on their statute books.

"The airplane, the automobile and radio have almost obliterated city, county and state boundary lines. Citizens cannot satisfactorily comply with one set of safety laws or orders today and another set tomorrow. The means found effective in preventing a certain type of accident in one State should also be effective in another. The purpose of the Western Safety Conference is to secure the maximum possible uniformity in safety rules, laws and order."

That statement was made two years ago and, like the intentions of many other groups which have been concerned by the lack of uniformity which exists between the requirements from State to State, should, by right, have passed into oblivion. But, strange as it may seem, the Western Safety Conference did more than just talk about uniformity, and there is today on my desk a complete break-down of the industrial safety requirements of the eleven Western States comprising the Western Safety Conference, Indexed and cross-indexed, these studies show an amazing lack of uniformity between neighboring States engaged in the almost identical pursuits, a dearth of adequate regulations in some jurisdictions, and in several instances, actual conflicts in the requirements.

But now, having found what their problem is, and having developed a close working relationship through the execution of this study, it is only a comparatively simple step to iron out the differences and proceed to complete unification and general acceptance.

This is an exhibit of safety equipment for the use of employees of a refinery. The exhibit was used to familiarize the workers with the equipment provided for them.

Right off the Docket

The trend of litigation on workmen's health and accident compensation is reflected in these briefs of the latest and most representative cases coming to trial in the intervals between issues. Familiarity with this trend is important to every industrialist.

Maryland Court Reverses Commission —Throws out Defense of "Occupational Disease"

The claimant in this case sustained her injury while operating a machine for sewing buttons on shirts. The operation of the machine required a constant pressing upon a knee press. An inflammation of the knee developed. The Commission refused an award on the ground that the evidence did not support a finding that the disability resulted from an accidental injury arising out of and in the course of employment, as required by the Maryland Workman's Compensation Act.

Reversing the Commission, the Court held the injury was not an "occupational disease"; that the evidence showed the knee press was stiffer than customary; that the injury was sudden and unexpected as those terms had been interpreted by the decisions of the Courts, and consequently the disability had resulted from an "accidental injury." *Foble et al vs. Knefely (Maryland) 6A 2nd 48 (April 1939).*

Cancer Compensated as "Accidental Injury"

The disability resulted from a cancer of the foot. The Compensation Bureau and the lower courts had denied an award on the theory that the condition was "occupational" and not the result of an accident arising out of and in the course of employment.

The facts were: The claimant operated a machine which made building blocks from ashes, sand, and cement. While working, the sand and ashes accumulated in the employee's shoes. The worker had a pigmented mole on his foot. The ashes and sand irritated it, and a malignant cancer developed.

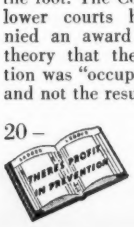
The Court stated: We cannot agree that this was an occupational disease. An occupational disease is one that from common experience is visited upon persons engaged in a particular occupation in the usual course of events. It is one that is incidental to the employment itself. The evidence disclosed that the employee felt pain where the mole was located on a certain day; that the mole bled; that sand and ashes were around it on that day. There is no evidence of constant irritation prior to this time. This is sufficient proof of an unexpected occurrence—of an accidental injury.

Bollinger vs. Waganaw Bldg. Supply Co. (New Jersey) 6A 2nd 396 (May 1939)

Award Made in Two Cases for Death Resulting from an Aggravation of a Pre-Existing Heat Condition

Holding that an accidental strain of a heart, even though the heart was previously weakened by disease,

Digested and compiled by
Hilton E. Roberts
Member Ohio and New York Bars



may be a compensable injury under the Compensation Act, if the accident arises out of and in the course of employment, the Courts of New Jersey made awards in two recent cases for death resulting from heart strain.

In the first case, the employee died while unloading 60 to 85 pound crates of oranges. In the second, the strain was suffered when the employee, a milkman, was ascending a hill to his truck, after making his milk deliveries.

Rother vs. Merchants Refrigerating Co. (New Jersey) 6A 2nd 404 (April 1939); Hentz vs. Janssen Dairy Corporation (New Jersey) 6A 2nd 409 (May 1939)

Failure to Submit to Curative Operation Bars Recovery

The claimant sustained an injury to his hand. He received compensation for a while, but payments were stopped when he refused to submit to a curative and rehabilitating operation. His hand became worse and he sought further compensation, offering medical testimony to the effect that the operation would not have helped him if performed. The Court refused his application stating that the entire question was finally decided at the time of the refusal to submit to the operation. The fact that the employee's hand became worse did not lift the bar resulting from his refusal to submit to the curative operation.

Kolbas vs. American Boston Mining Co. et al (Michigan) 286 N.W. 91 (June 1939)

Ohio Amends Its Workmen's Compensation Act to Make Blanket Provision for all Occupational Diseases

In the May issue of OCCUPATIONAL HAZARDS AND SAFETY, the case of Triff vs. National Bronze and Aluminum Foundry Co., 135 O.S. 191 was reported. That case held that the right to bring a common law action by an employee for negligence of his employer directly resulting in a non-compensable occupational disease had not been taken away by the provision of the Ohio Constitution creating the Workman's Compensation Act. The Triff case overruled previous decisions which had held that the only remedy the employee had was under the Compensation Act.

As a result of the Triff decision, the Legislature of Ohio recently amended the Workmen's Compensation Act to include all occupational diseases. The new provision is effective as of May 26, 1939, and brings Ohio among those blanket provision states wherein the remedy of the employee and the responsibility of the employer is certain.

Proper Hood Protection

It is notable that, in a great many industries, where metallic dusts are generated, the worker swathes his neck and head in various dirty and unsightly rags. This practice is not confined to workers in metallic dusts but exists among paint spraymen, polishers, and those who work with non-metals.

The proper procedure to eliminate the use of such materials is to provide, where needed, hoods of cloth, impregnated cloth, or other suitable material which will fall to the employee's shoulder. These hoods may or may not be provided with a positive supply of clean air. Should the irritant be pronounced, an air supplied hood should be used or, if toxic considerations also enter into the picture, the hood may be used in conjunction with suitable respirators. In the case of paint spraying, the air supplied hood alone is sufficient to take care of the toxic pigment and vapor as well as to eliminate the irritant properties of such materials. Vision is provided in some cases by suitable openings in the hood, and in other cases by the use of such plastics as "Plastacele," "Lucite" or "Plexiglas."

Where acids or similar corrosive liquids are in use, the closed hood in conjunction with a chemical cartridge or the open eyepiece type hood with an air supply is effective.

COOLED WATER

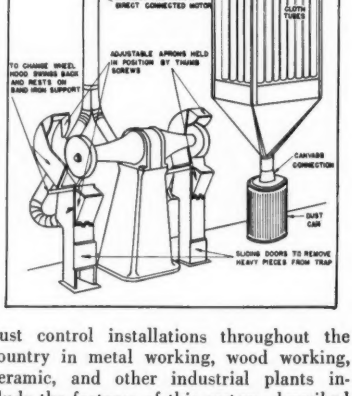
A new line of water cooling units, eliminating necessity for long runs of circulating cold water by providing drinking water electrically cooled at single or multiple points of use, by means of a single refrigerating unit located at any convenient remote point is announced by Cordley & Hayes, New York City.

These remote units consist of a high-efficiency cooling unit combined with water tank and coil. Refrigerant is run through copper tubing to each cooler from a condensing unit installed at any out-of-the-way location. Desired water temperature is automatically maintained at every bubbler.

INDIVIDUAL DUST CONTROL SYSTEM

To provide better, as well as more economical, control in plants where isolated grinding, polishing, buffing, and other dust-producing operations are necessary, an individual Dust Collecting System has been developed by The Kirk & Blum Manufacturing Company.

Many of the largest and most successful


DUST FILTER
EXHAUST FAN WITH A DIRECT CONNECTED MOTOR
CLOTH TUBES
TO CHANGE WHEEL HOOD SWINGS BACK AND RESTS ON BAND IRON SUPPORT
ADJUSTABLE APRONS HELD IN POSITION BY THUMB SCREWS
CANVASS CONNECTION
DUST CAN
SLIDING DOORS TO REMOVE HEAVY PIECES FROM TRAP

dust control installations throughout the country in metal working, wood working, ceramic, and other industrial plants include the features of this system, described in the accompanying illustration. It is shipped complete and knocked down, and can be easily installed by the purchaser's maintenance men.

Details of each installation depend on individual factors which include the diameter of the largest wheel used, height from floor to center of wheel, and amount of head room available.

FIRE WARNING

A method of fire warning for institutions and factories is the development of The General Fire Truck Co. It consists of two bombs arranged so that in the event of fire, first one and then the other is fired off by the operation of fusible links. No outside connections are necessary; the Two-Bomb Life Guard Fire Warning is shipped ready to screw into location.

FUME RESPIRATOR

Willson Products, Inc., Reading, Pa., announce the Bureau of Mines Approved Type B Mechanical-Filter Respirator for protection against fumes of metals.

This new product, designated as Willson Respirator No. 770, bears Bureau of Mines Approval No. 2128 "for protection against

Additional information and descriptive literature on any of the products mentioned in this service department may be obtained by writing Dept. N, Occupational Hazards & Safety, 812 Huron Road, Cleveland, Ohio.

THE FIELD

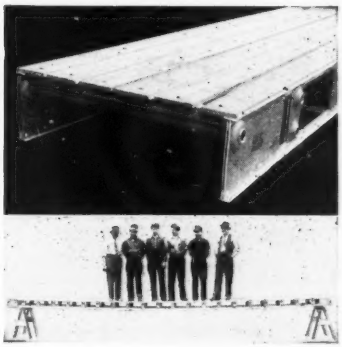
fumes of metals such as lead, mercury (except mercury vapor), manganese, magnesium, aluminum, antimony, arsenic, copper, chromium, iron, cadmium and zinc resulting from sublimation or the condensation of their vapor, or from chemical reactions between their vapors and gases." Said to be of special importance is the protection afforded by the respirator against the inhalation of lead fumes generated by heating and volatilizing lead, such as the fumes generated in lead burning and soldering, smelting, type founding, and fusing lead glaze and enamel.

ALUMINUM STAGE

A new Aluminum Stage, made in various lengths from 8 ft. to 25 ft. and widths from 12 in. to 24 in., has been placed on the market by the Aluminum Ladder Co.

These stages are for use in cleaning, painting or repairing walls and ceilings; bridging across tanks; maintenance work in factories; building operations. Guard rail can be supplied for one or both sides, if desired.

The stage illustrated is 25 ft. long and 2 ft. wide, yet weighs only 118 lbs. Because of their light weight, Aluminum Stages are easily moved from place to place and the danger of strain or rupture is greatly lessened.



All parts of the new stage are completely bolted and riveted together. Because there are no nails to work out, there is no danger of men tripping and falling while using the stage.

TROLLEY GUARD HANGER

The M.S.A. Trolley Guard Hanger, a new safety device, said to give protection against mine trolley wire hazards, has just been announced by the Mine Safety Appliances Company, Pittsburgh, Pa.

The new Trolley Guard Hanger can be attached to all sizes of trolley wire without alteration or change in the present trolley wire installation.

The Hanger consists of two plates, which clamp in the trolley wire groove and are held firmly in place by an insert screw. The plates support an insulated rigid wire, both ends of which are formed in U-shape. To each of these hooks is attached a 5" wide rubber sheet, which hangs at the side of the trolley wire. Correct spacing of the guard hangers is from 6 to 8 feet apart. This new product, according to the manufacturer, is extremely economical to maintain.

Statements made in connection with any product mentioned in this service department are based on manufacturers' claims. Although these claims are believed to be true, this magazine does not guarantee that to be the case.

INDUSTRIAL HYGIENE
in the Prevention of Dermatitis

By G. C. Harrold, Ph.D.
Chief Chemist, Industrial Hygiene Division, Chrysler Corporation

(Concluding installment of a series on the problem)

PREVIOUSLY we have discussed mechanical cleanliness, which embraces the engineering methods of keeping the environment clean, as well as the factors of personal protective devices and methods, where mechanical protection is not effective or is not desired. The following discussion is concerned with that phase of dermatoses which is true industrial hygiene rather than industrial sanitation. By "industrial hygiene" is meant that which pertains to the individual rather than the environment; environmental correction is properly industrial sanitation, though general usage has endowed the term "industrial hygiene" as applying to all the phases of environment and personal protection.

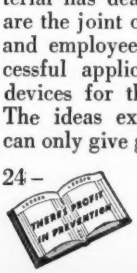
Whereas the previous article referred partially to personal protective devices and partially to a combination of protection and personal cleanliness, this review will have to do with employee cleanliness in its various aspects. Much of the previous material has dealt with subjects which are the joint concern of the employer and employee in respect to the successful application of methods and devices for the worker's protection. The ideas expressed in this article can only give good results through the correct application of principles of personal cleanliness by the worker. Given towels, proper cleansing agents, and water, the individual bears the complete responsibility of so using these materials as to protect himself. And it should be emphasized that all the equipment mentioned previously is in its entirety no more important than the proper use of cleansing agents by the worker.

Clean Workmanship

The first responsibility of personal cleanliness involves the proper handling of the job engaged in by the employee. A careless, sloppy approach to any operation involving a skin hazard will lead to the intensification of any potential hazards involved. One man or group may perform a brazing or soldering job with such care that no exposure to irritant flux or acid washes will result. In the same shop, other employees may operate in such a way as to be continually splattered with acids, alkalis, or whatever mixtures may be used as fluxing agents. It is such carelessness that requires medical treatment, no matter what forms of protection are devised.

Washing Facilities

The careful workman will want to wash frequently even though his ex-



posure is smaller than the careless operator. However, the proper washing of groups of employees is a more complicated task than appears on the surface. The first essential is a supply of clean, warm running water. If hot water is not available, good cleansing agents designed for use in cold water should be provided. Paper towels provide a sanitary means of drying the skin. Time should be taken to thoroughly dry the skin surface or the effort of washing will be at least partially wasted. Chapped, roughened and cracked skin areas will result which may lead to infections and certainly will offer a good foothold for irritant substances.

The washroom should be large enough to handle all the employees coming off duty at any one time. Any operation which involves body exposures to irritants should be near shower room facilities with individual locker space. Even coal dust becomes an irritant of a mechanical type when the exposure is extreme or prolonged. When coal or metals are deposited on the body, it becomes evident that washing is necessary. What is too often neglected is the fact that irritant gases, fumes and vapors can cause even more dermatoses, even though there is no deposit of colored dust to induce the workman to use the shower room.

The entrance to the shower should be so arranged that one entering and leaving the shower will have to stand in some type of disinfectant solution. One liquid found efficient and cheap consists of 20 per cent by weight of common salt dissolved in water. It has been found that, in addition to being effective, this solution is much easier to maintain due to the fact that the dilution or evaporation does not change the concentration, so that a harmful or useless concentration

The wash room should be large enough to handle all the employees coming off duty at any one time.

exists. Many solutions used for this purpose are only effective in certain limited concentrations or, if the concentrations are increased, become skin irritants themselves.

As a further aid in preventing the spread of "athlete's foot," the floors and walls should be sprayed occasionally with some such disinfectant as formaldehyde. If possible, this disinfectant should remain overnight after which the room should be flushed thoroughly with large quantities of water.

Wash basins or fountains should also be kept clean and disinfected. Containers for dispensing cleansing agents should be spaced so that not more than seven men use one dispenser. Good results are obtained when one dispenser is provided for every four wash basins.

Soap

The cleansing agent dispensed is of the utmost importance. Statements made by various regulatory and control organizations indicate that a great many cases of dermatoses are caused

by harsh or irritant cleansing mixtures. It becomes mandatory then to select a cleansing agent which will aid in the prevention of dermatoses by efficiently cleansing the workman's skin without providing another source of injury.

There are available liquid, solid, paste or gel, and powder types of cleansing agents. These types can consist of one cleansing substance plus moisture, or they can consist of two or more substances mixed together.

Disinfected floors and walls and proper shower and locker facilities tend to discourage high indices of infection.

Without becoming involved in a long technical discussion, it might be well to consider how each type meets the requirements of an ideal industrial hygiene cleanser.

First, a good liquid soap has the advantage that it can be designed to operate in either hot or cold water depending on the chemical constitution of the soap used. Such a soap has no abrasive qualities, which is both a good and a bad feature; good, because no mechanical irritation of the skin can take place, bad, because it is useful to have some mild abrasive action present to remove heavy layers of grease, carbon, iron, etc. Certain types of liquid soap, as is true of solid, paste, or powdered soap, can of course give rise to chemical irritation. Due to the lack of some abrasive action, the cost per man day of washing may prove to be high in some operations. Also, the variable amounts of water included may result in a soap, which appears to be cheap, having a high unit cost. About the same considerations apply to the solid cake of soap. In addition, the solid soap does not clean fast enough to satisfy the workman who is in a hurry to get home or to eat his lunch.

Paste soaps can be made which will work equally well in hot or cold water. Paste soaps, however, may be made with harsh inorganic abrasives, as the milder organic abrasives will swell and become useless when soaked in water, which is the usual solvent incorporated in paste soaps. These harsh abrasives, such as silica or silica derivatives, will cut and open the skin so that more harm than good will result. The inclusion of kerosene or other organic solvents in pastes usually leads to chemical irritation, in addition to the physical abrasion of the skin. The paste type soap, even though sold at small cost per pound, is usually found to be more expensive per man day than either the liquid or powdered cleanser. This results

from the inclusion of large quantities of water in the product which has been found by analysis in some cases to be as high as 85 per cent of the total weight of the paste cleanser.

A straight powdered soap without any abrasive has some of the objections previously discussed. However, a powdered cleanser, consisting of various ingredients each designed to perform a specific function will most closely approximate the ideal industrial soap.

As an example, this laboratory has designed for industrial use such a powdered cleanser consisting of the numerous ingredients which might be used. The soap content of the mixture consists of two different kinds of soaps so that as efficient soap action is to be had in cold as in hot water. In other words, the mixture is composed of one soap which will give a lather in cold as well as hot water, and of another soap which is much more effective in hot water but which will be effective in cold water if sufficient dissolving time is allowed. Together they provide a quick lather and a more permanent lather.

The scrubbing action is provided by means of two mild organic abrasives. The one abrasive of a carefully selected size is fine enough to scrub out the finer ridges in the skin, without being so fine as to cause a lumping of the powder when water is applied. The other organic abrasive is of coarser material to provide a rapid means of removing the heaviest layers of grease, carbon, iron, or other substances without too great a drain on the soap supply. In addition, one of the relatively new phosphate cleaners is added in small percentage to aid in the washing action. The moisture content is less than 10%.

While not essential, at little or no cost a comparatively neutral odor can be added which will enhance the cleanser's attractiveness in some cases. The inclusion of very small amounts of carefully selected types of the newer wetting agents will also aid in the cleaning action of the soap powder.

Tests over long periods of time, under extreme conditions, such as shaving, etc., showed that this cleanser would not irritate the skin so as to itself be a cause of dermatoses.

The cost of such a soap proved to be less than any other known to us when calculated on a thousand man month usage basis.

Employee Responsibility

While excellent results can be obtained from a type cleanser which approximates the industrial hygiene ideal, it must be stated that the responsibility for attaining such results rests with the employee. Educational posters must be placed in the wash rooms instructing the men "how to wash." In order to use any powdered cleanser efficiently, the skin surface should first be moistened thoroughly, then the soap should be sprinkled sparingly on this surface.

While it might appear that too much space has been devoted to personal cleanliness, it is our belief that this factor is the most important one which we have discussed. It might be pointed out that all the engineering devices and protective clothing are designed for the purpose of keeping the skin clean. Should such measures fail, it is imperative that the contaminations present on the skin be removed. Generally speaking, it is probable that proper washing provides the cheapest and most effective means of reducing dermatoses cases.

SAFETY PROGRAM

[*Continued from page 16*]

nent possessor of the trophy and it is placed in a prominent location at or near the main entrance of the plant, where it may be seen by all. All plants having had the trophy for one quarter receive a large photograph of the trophy as evidence of their good work, even though they failed to secure permanent possession. These contests have proved very valuable in arousing and holding the interest of the employees. Monthly charts showing the standing of all operations on both frequency and severity are sent to each plant from the office of the Safety Director in Pittsburgh. The complete record of all Lost Time Injuries is broadcast to all operations as an educational effort.

In each plant a contest is conducted between the various departments. There is displayed in each department an attractive sign on which is prominently indicated the number of days of operation since the last Lost Time Injury occurred. The men are quite proud of their records and always on the lookout to keep them clear.

Our paint factory in Los Angeles, California, has operated twelve years without a Lost Time Injury. The paint factory in Portland, Oregon, has had a clear record for eight years. These are the longest clear records—although there have been several of three years.

Examination

Pre-employment physical examinations are very thorough in order to properly place new employees. Every reasonable effort is made to avoid placing new employees on work which might be detrimental to their health. Whenever correctable conditions are found, by the examining physician, which indicate unfitness on the part

This is the type of equipment used by men in both the plate and window glass divisions.

of the applicant he is advised to see his own physician. After having his unsatisfactory conditions corrected he can return for re-examination and employment. After employment he may be examined at periodic intervals and if conditions warrant he may be

transferred to other work, but never taken out of service on account of his condition. In the paint division all employees exposed to health hazardous substances are examined on a monthly schedule. Every effort is made to aid the employees in maintaining their health, but no paternalistic medical work is done by the company.

Eye sight surveys have been made from time to time and when defective vision is found, the employees are required to procure corrected glasses. This is a very important item, not only from a Safety viewpoint, but in maintaining the efficiency of those concerned. The surveys are made at no cost to the employees.

A very complete health survey was made of all operations—checking from a medical, as well as a chemical and hygienic view point. The company recognized its responsibility in providing safe work areas for all employees. Where unsafe conditions were found, immediate steps were taken for their correction. Many of the corrections involved complete changes in some operations, as well as changes in materials handled. The changes made have resulted in the best of working conditions and the company has been highly praised by State and other authorities who have visited the various operations. The question of injurious dusts, which has caused so much grief during recent years, has been placed under very complete control.

Results Far Reaching

A regular check is made of all operations by a highly trained Industrial Hygienist. Checks are made for dusts, fumes, gases or any other detrimental condition—not only of a combustible but also of a toxic nature. An idea of the magnitude of this work might be had by mentioning that our largest paint factory was found to have approximately 28,500 formulae on their schedule. Many of these formulae had injurious ingredients and as far as possible substitutes were immediately placed on the "Want List." Some of the formulae were definitely discarded on account of the hazards of manufacture, the company not being willing to make materials which were extra hazardous to the employees.

As a definite result of this program, the number of Lost Time Injuries has greatly decreased. The low mark of 72 was recorded in 1932, a reduction of 95% over the year 1922, which was the highest record of the Company. Since 1932 there has been an average rate of 191 per year, or 86% reduction. The year 1937 had 211 cases. The increase of cases since 1932 has been mainly due to the labor unrest and not to any let up in the safety activities.

It might be of interest to note that very few of the injuries now occurring are any different than those received in the homes of other places. Glass cuts of any consequence are seldom reported and are extremely rare to parts of the body for which protective equipment has been developed and provided. Slight cuts on the fingers are about the extent of this classification and are to be expected, due to sharp edges of glass and the impractibility of wearing any protection on the fingers.

We, as a Company, are sold on Safety as an operating problem. We are fully convinced that it is not only good business, but the right way to operate.

FIRE EQUIPMENT Pointers

SAMUEL R. BAILEY, V.P. & G.H.
The Bailey Co., Inc., Amesbury, Mass.

FIRE is perhaps not included in the subject of industrial accidents, but is a hazard with considerable possibilities for injury to persons as well as property.

We all have sprinklers, extinguishers, fire pails, etc., but I believe very few plants have what is just as important as sprinklers, and they are important because of sprinklers, and that is fire blankets or protective blankets. Immediately after a sprinkler goes off, you are faced with a possible loss which can be much greater than the fire which was extinguished by the sprinkler, that is, water damage in the floors below. We have a number of fire blankets placed in convenient positions in our plants for such protection.

All plants now-a-days have extinguishers but be sure that you not only have the usual soda and acid extinguisher but also have foamite extinguishers or other means of handling oil or paint fires. Soda and acid extinguishers should be refilled every year and it has lately become a rule that the foamite extinguishers should be refilled periodically.

Sprinklers

In refilling soda and acid extinguishers, it is not necessary to discharge the extinguisher and thus waste the contents. Open the extinguisher, dump out the soda and water mixture, see that the hose is clear, replenish the soda and water and replace the acid bottle as is, making sure that it is refilled.

In connection with sprinklers, there may be a few who are not aware that there are high temperature sprinkler heads. It is sometimes the case in forge rooms or heat treating rooms that high temperatures are developed which are not a fire hazard but which may release the sprinkler head. If you have such locations, bear in mind that high temperature heads are available which will relieve you of the possibility of water damage.

In our two plants, we have three different sprinkler systems with three different shut-offs and drains. We keep a light burning twenty-four hours a day at each of these shut-off valves, we take particular pains to see that passageways to them are unobstructed and several men have been instructed in the procedure of shutting off the system and opening the drains. It is particularly important that once the sprinkler has extinguished the fire the system be shut off and the drains opened.

From a fire point of view, we consider it to our advantage to have a system of emergency lights in the factory. These are connected to our main power source and do not go through any other panel board. The system is comprised of a series of lights in all stair towers and one or more lights per floor. The main switch for this system is just inside of our front door and our front door has a window in it that can be broken in case of emergency.

[*Please turn to page 32*]

THE CARE OF WIRE ROPE

[*Continued from page 10*]

material handled, with wood padding at sharp corners and also that any boxing or crating must be substantial to withstand the pressures to which same may be subjected.

It is recommended that all slings be equipped with a metal tag on which should be noted the following:

Diam.	—as 7/8"
Grade	—as Plow Steel
Safe Load	—as 8500 lbs.
Date	—as Nov. 16, 1938

Slings should be inspected periodically by an experienced and competent man who should be held responsible for their condition and when same should be discarded.

And as a final safety consideration, all wire rope slings should be made only of preformed wire rope, as broken wires will not protrude to the same extent as in non-preformed rope and to the man charged with the safety regulations in a plant or on a job, this is a most important consideration.

Winch lines as used on trucks of the public utilities are subjected to varying usages; those on aerial line trucks are both an operating rope and a sling, as they operate over small sheaves and wind in multiple layers on small drums. Ropes 5/16" to 5/8" diameters are used and these are usually a 6 x 19 Warrington or Filler Wire Plow Steel rope with manila center and having a loop or eye spliced in the outer end of the rope.

A removable type of hook is used in connection with these ropes and is inserted into the loop of the rope; it is a rather ingenious fitting and meets the service requirements very effectively and efficiently, too.

These ropes are generally discarded due to breakage of wires at the outer end of the rope; when new, the factor of safety on the rope should be 6 as a minimum and should be discarded when the safety factor is 4-1/2.

Watch Wear

As these ropes are subjected to some wear, together with crushing and distortion on the drums, it is suggested that such ropes be discarded when there are 18 outer wires broken within the length of one rope lay.

For trucks equipped with a winch line for conduit cable pulling service, in which the rope is not only subjected to bending over small sheaves and drums, together with crushing and tearing abuse as it winds in multiple layers on the small drum, but also to wear or abrasion in the conduit, a sturdier type of 6 x 19 rope is used, that is, a 6 x 19 Seale rope of Plow Steel quality, with a manila center; these ropes usually being 3/8" to 1/2" diameter.

The factor of safety on these ropes should be 6 as a minimum for a new

Compressive Stresses on Material Handled

Legs of Sling at Angles with Horizontal of	60°	45°	30°
For 10,000# Load	2900	5000	8660

rope and the rope should be discarded when the factor of safety is not less than 4-½: A 6 x 19 Seale rope with the outer wires worn to 60% of their original diameter would reduce the breaking strength of the rope by 25% and the outer wires worn half through represent a loss in strength of 32%; it is rather difficult to measure the amount worn off an outer wire and consequently it should be left to the judgment of a competent man.

The Reserve Strength of a 6 x 19 Seale rope is approximately 36%, so that if 21 outer wires are broken in the length of one rope lay, the rope strength will be decreased 25%. These ropes are usually worn too; consequently, it is suggested that the rope be discarded when there are 10 outer wires broken in the length of one rope; this will compensate for some of the wear to which the rope is subjected.

It should be appreciated that the rules suggested for the discarding of slings and winch ropes are rather approximately or arbitrarily set, in the hands of a competent engineer; due allowance can be made for worn and broken wires and with the Reserve Strengths of the ropes known (as noted above); rules for the discarding of these ropes may be established by study of each individual problem to suit the safety requirements of each particular rope.

It is recommended as a safety consideration that all winch lines shall be of preformed rope, as broken outer wires lie flat and will not protrude and cut the workmen's hands; furthermore, preforming a rope greatly increases the bending life properties of the rope and same will wind more evenly or uniformly on the drum.

FIRE POINTERS

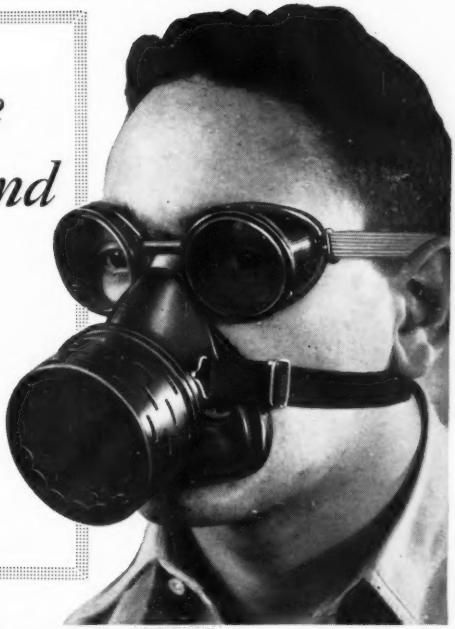
[*Continued from page 30*]

One change which was made and which has been interesting, at least to me, is the change which we have recently made in our blower system. Ever since I can remember and in practically every exhaust installation which I have ever seen, it seems to have been the custom to put the dust separator way up in the air somewhere, usually on the roof. We followed this practice, even had the exhaust blowers in the attic at our factory. Recently we moved all blowers into the basement and draw all buffing dust, sawdust and woodchips downward using vertical direct runs as much as possible. This is of advantage for two reasons. We have the advantage of gravity working with us to get this dust and shavings out of the factory and further, in case of fire, a hose can be played right into the suction opening and the whole system flushed down with a minimum of effort and with practically no danger from fire or water, all of our blower pipes being so hung that they drain by gravity outside the building.

Lacquer rooms present serious hazard not only from the point of view of fire but from that of explosion and subsequent injury. I am rather proud of the following precautions which we have observed in our lacquer room. All lights and light wiring in that room are in explosion proof fittings. No compressor or ventilating machinery is in that room and all controls for the lights and the compressors and for the ventilating fans are located outside of the room and the lacquer benches are metal and properly grounded.

Guard the Comfort and Efficiency

OF WORKERS IN TYPE A DUSTS



patented

with the AMERICAN R 1000 *Respirator*

New type of inhalation valve assures easy intake of breath . . . minimizes rebreathing . . . keeps worker's efficiency high. Twin exhalation valves, one on each side, positively expel "used" air, even when worker's head is down . . . and they won't stick open, fill with moisture or freeze.

These features . . . combined with the pliable, easy-fitting mask and non-slip headband (either single or the new *double* type) . . . provide dependable, comfortable protection at extremely moderate cost. Write for Bulletin TL 119.

AND WATCH FOR IMPORTANT NEW DEVELOPMENTS IN THE AMERICAN R 1000 RESPIRATOR

Approved for Type A Dusts by U. S. Bureau of Mines.

AMERICAN OPTICAL COMPANY

Manufacturers, for more than 100 years, of products to aid and protect vision. Factories at Southbridge, Mass. In Canada, Consolidated Optical Co., Ltd. Branch offices in all principal industrial centers.

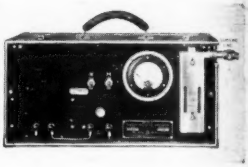
M-S-A GAS INDICATING and DETECTING INSTRUMENTS

M. S. A. EXPLOSIMETER

This low-priced, pocket-size combustible gas indicator tells you of explosion danger at the working place—easily, instantly, accurately—and is so simple to operate that any average workman can use it. Direct-reading meter indicates flammable gas concentrations in per-cent of the lower explosive limit; comparative readings above or within the explosive range are obtained with a dilution tube. Write for Bulletin No. DN-1.

M. S. A. CARBON MONOXIDE INDICATOR

Continuously indicates CO concentrations from 0 to .15% in air (the dial can be read to .005% and estimated to .001%). The Indicator is compact and portable, reliably accurate, and is particularly adapted to surveys of atmospheres in plants, vehicles and aircraft, and in checking furnace operations, burner installations, etc. Operation is from self-contained Edison cells or any outside 6 volt, A.C. or D.C. power source. Also available in hand-operated model eliminating necessity of electric power supply. Bulletin No. DS-1.

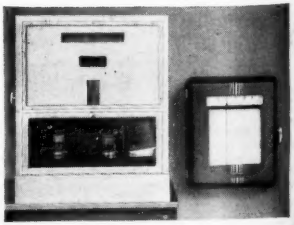


M. S. A. HYDROGEN SULPHIDE DETECTOR

The only available instrument of its kind, the M. S. A. H_2S Detector is invaluable for rapid and accurate detection and measurement of low but dangerous concentrations of this highly toxic gas on the job. Hand operated, light, compact and easily carried, the unit indicates H_2S concentrations from .0025% to .04% by volume. Anyone can use it, in the many fields where hydrogen sulphide occurs. Bulletin No. DY-2.

M. S. A. OXYGEN RECORDER

The new M. S. A. Oxygen Recorder continuously analyzes and records concentrations of oxygen in gaseous mixtures. Can be supplied to analyze ranges of 0 to 1%; to 0 to 15%. Used in chemical processes; measurement of excess air in product of combustion from burners; measurement of oxygen in natural and manufactured gases, etc. Full details of this latest development of M. S. A. Research are contained in Bulletin No. DW-1.



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